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GB 1519644
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GB 1222052
GB 930171
GB 751289

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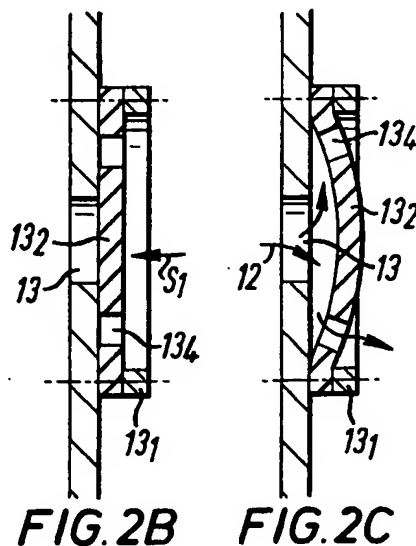
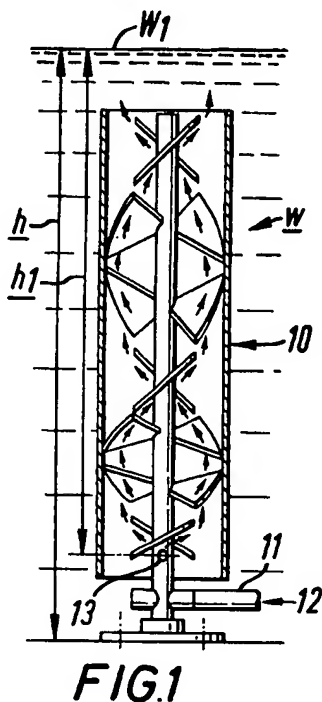
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(54) Improvements in circulating and
gasifying apparatus partly or
wholly submerged in a fluid

(57) A non-return valve 13A is fitted to
an orifice 13 in an apparatus W to
prevent blockage of said orifice during
installation from a fluid flow in
opposition to that experienced in use.
The fluid flow is for example a flow of
liquid with entrained foreign material as
experienced in sludge treatment
process.

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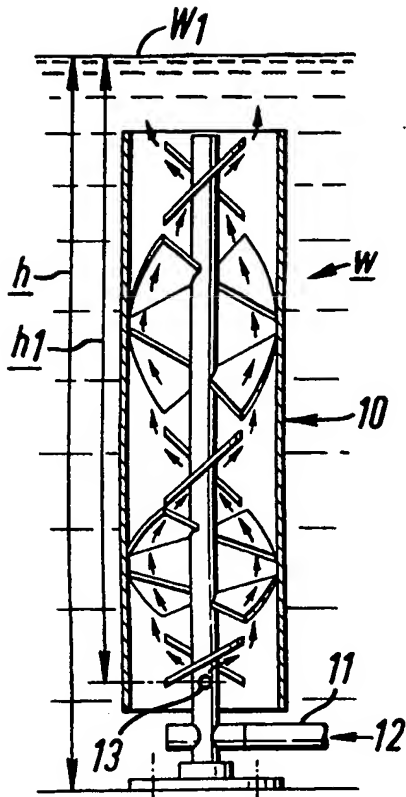


FIG. 1

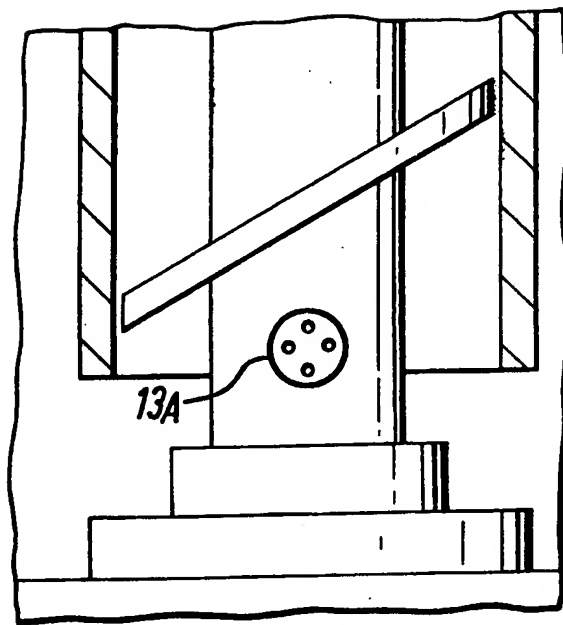


FIG. 1A

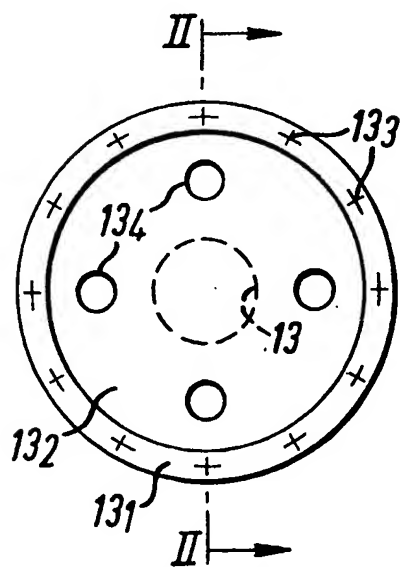


FIG. 2A

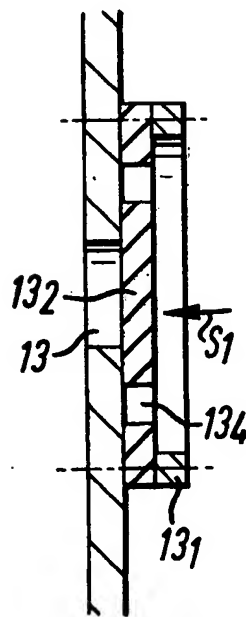


FIG. 2B

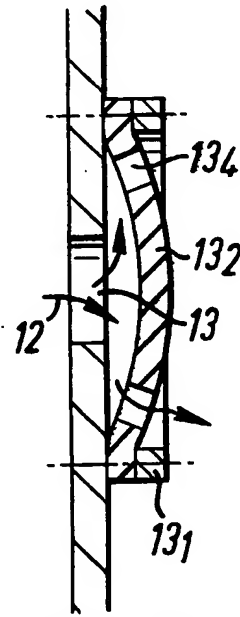


FIG. 2C

SPECIFICATION

Improvements in apparatus partly or wholly to be immersed in a fluid

This invention relates to apparatus that in use is immersed partly or wholly in a fluid and thereby subjected to a pressure head. It is clear that any apparatus that is installed for example below the surface of a liquid will be subjected to a hydrostatic pressure head but it is generally lost sight of that a given depth will subject the apparatus to liquid flow through its orifices and apertures by virtue of said pressure head before it is connected for its correct operation in use, and that this liquid flow may be such as to block or otherwise cause malfunction of the apparatus before it is operational. We have found as one illustration of the drawback referred to above and possible danger therefrom that our apparatus described and claimed in United Kingdom Patent Specification 1,519,644 provided in use with an air bubble emitting orifice of 6 mm diameter for pressurized air was blocked by an article of clothing irrevocably forced into it by a pressure head generated by but a few feet of sludge water.

According to the present invention this drawback is overcome in apparatus that is to be installed in a fluid and thereby subjected to a pressure head during such installation and a fluid flow through an orifice therein in a direction opposite to that which it will enjoy in use by the provision of a non-return valve at said orifice.

The invention will be more fully understood from the following description given by way of example only with reference to the figures of the accompanying drawing in which:-

Figure 1 is a side elevation of an apparatus for circulating and gasifying a liquid and

Figure 1A is an enlargement of a part only of that apparatus as indicated.

Figures 2A, 2B and 2C show serially to a larger scale a front view of a non-return valve and two side elevations in diametral section on the section station III of Figure 2A when the said valve is closed and the said valve is open.

Referring now to the Figures of the drawing apparatus for circulating and gasifying a liquid is shown generally at 10. Air enters by the pipe 11 as shown by arrow 12 and comes out in operational use of orifice 13. Let us now consider the installation of apparatus 10 at a fully immersed position below the surface W1 of sludge water w at a depth of h feet prior to the connection of air supply 12. Orifice 13 is subjected to a hydrostatic pressure head h_1 and a flow of sludge water will take place in a direction in contradistinction to the direction of the air that in use will be emitted from it. Any foreign matter entrained in the flow of sludge water will enter orifice 13 and may block it since orifice 13 in one example is but 6 mm in diameter. To prevent such a blocking of said orifice 13 we provide, as shown in Figure 1A, a non-return valve 13A drawn to a larger scale in Figures 2A, 2B and 2C.

Non-return valve 13A comprises an outer ring 13₁, a diaphragm 13₂ and bolts 13₃ around the periphery

of the diaphragm 13₂ and ring 13₁. The diaphragm 13₂ has a number of holes 13₄ outside of the open area 13₅ of the orifice 13.

The *modus operandi* is elementary yet efficacious; in Figure 2B at installation pressure head h_1 generates a flow of sludge water indicated by arrow S1 and diaphragm 13₂ acts as an obturator and closes onto orifice 13, the holes 13₄ being blocked. After installation at depth h and air line 11 being supplied with air 12 diaphragm 13₂ opens (Figure 2C) to allow air to escape from orifice 13 via holes 13₄. We prefer to make the diaphragm 13₂ of rubber and all other parts of non-metallic or non-corrosive materials since the valve has to operate for long periods without maintenance.

CLAIMS

1. In apparatus that is to be installed in a fluid and thereby subjected to a pressure head during such installation and a fluid flow through an orifice therein in a direction opposite to that which it will enjoy in use, the provision of a non-return valve at said orifice.

2. Apparatus according to claim 1 wherein the non-return valve is a diaphragm that acts as an obturator to said orifice and is retained by a peripheral ring, said diaphragm containing one or more holes placed outside the area of said orifice.

3. Apparatus according to claim 1 or claim 2 wherein the non-return valve is made wholly of rubber.

4. Apparatus constructed and adapted to operate substantially as hereinbefore described and as shown in the figures of the accompanying drawing.

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